



DECEMBER 1986

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Ø BEAT



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The Pikes Peak Radio Amateur Association meets on the second Wednesday of each month at Giuseppe's Depot Restaurant at 10 S. Sierra Madre at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Phil Somers VE1ARC, 1075 Allegheny Dr. Colorado Springs, CO 80919 590-7136

EDITORIAL NOTES

Christmas is almost here. What are you going to get from Santa? A new HF rig with all the latest features? Maybe your first big amplifier running the legal limit? Or are you finally going to get some packet gear? Whatever has gear you get, it probably won't be a surprise. Set your spouse had to be "coached" on just what to get for you, and vice versa. I heard of a novel approach to solve this problem. You buy yourself a nice gift and don't tell your spouse what it is, and again vice versa. Wrap up each gift. Christmas morning, each person will get a gift that is a complete surprise to the other, and both will get exactly what they wanted. Try it!

I am really looking forward to the Christmas Party. All reports on the Iron Springs Chateau have been great. We really do need to get a few more people signed up. How about all the Saturday morning breakfast regulars. We have 28 now. Lets go for 40. See the info in this issue for last minute reservations. To help everyone tell who is who, wear your club nametag to the Christmas Party. Remember the drawing for the HI!

The holidays will probably provide a bit of extra time to do some operating. Why not take advantage of the opportunity to do something different. If you haven't been on CW for a long while, dust off the old key, and make a contact or two. Try one of the new bands you have not yet worked. Above all, have a safe and happy holiday and see you in 1987.



"Thanks
Chris !!!"



Frank KROYEM would like to express his sincere thanks to Chris, WBØDHU and all the club members who helped him with their time and advice to get his Novice license, and to set up his station. In particular, Chris was a great help, with visits to Frank's home on several evenings. Frank very much enjoyed the nice Novice class that assisted him to get his license.

Frank has been quite active at his own station that he has recently gotten on the air. He has about 25 QSOs on 40 and 80 meters with a dipole and a tuner. He has worked Florida, Texas, Colorado, the Dakotas, Indiana, Kentucky and Michigan. His most interesting QSO so far was with a retired school teacher in Texas. The contact was ended when heavy QRM took over. Days later, they got together again and finished the QSO.

Frank should be an excellent inspiration to those studying for the Novice test, and Chris is an inspiration to those who spend much of their time helping others get into this great hobby. Well done guys!

"VIEW FROM THE PEAK"

by George Hinds, N8CIX/Ø

FROM "HIGH BALL" TO "HIGH TECH" -

HOW RAILROADS "KEEP 'EM ROLLING"

- Part One -

Railroad communications and signaling: two fields that have grown from a primitive beginning in the 19th century to the space age of the 20th century. We can see almost daily how radio and radar have contributed to the growth and safety of aviation; railroads are not as "high visibility" a subject to most of you and technical advancements may go unnoticed. While a book would be needed to describe the development of "train control" from start to finish, in this series of two short articles, I'll try to cover major developments.

Almost from the beginning of steel wheels upon steel rails, railroads found it necessary to control the movement of trains for two very basic reasons: safety and scheduling. In fact, this need arose just as soon as more than one train was operated over a single section of track, or where one track crossed another. Means had to be devised to keep them from colliding. (A Kansas law read: "When two trains approach each other at a crossing, they shall both come to a full stop and neither shall start up until the other has gone.")

Perhaps the first "train control" systems began with the use of "stuffs" and "high-ball" signals. Just as its name implies, the "high-ball" signal was a metal ball (similar in appearance to but several times larger than the common toilet bowl float) that was raised or lowered on a post - raised, "proceed" and lowered, "stop."

Turning to the "staff", this was nothing more than a wooden stick that was positioned at the beginning of a block of track between stations. A train, to enter the block, took possession of the staff at that point. A following train, finding the staff gone, could not enter the block until the staff was again re-

turned to its holder by the train that removed it, or by another train that had obtained possession at the other end of the section of track upon arrival of the first train. As crude as this system was, you may be surprised to learn that it was still in use on a few branch lines into the 1980's. Foolproof it was!

For the most part, trains were dispatched and operated by timetable authority. With the advent of the telegraph, orders could be issued to supersede the timetable schedules as conditions warranted. It is reported that the first telegraphic train order was refused by the train crew when issued; they would have no part of such foolishness as being given orders by a series of clicking noises over a thin wire in the 1850's.

Train orders were "handed up" to the engines and cabooses by a telegrapher who had received them from a dispatcher. Stopping was avoided by the use of a wooden "hoop" to which the orders were clipped, held up by the operator, to be snatched by the engineer and conductor as the train roared by. As one who for years had to "pick up" orders while rolling along on freight and passenger trains at high speed, I can verify that this practice sometimes resulted in very sore arms, stinging fingers and frequent cursing -- but seldom in missing orders and having to stop and back up to obtain them. The really brave men (and women) were the operators, standing close to the track as they had to do. For years, bamboo hoops were used; they were replaced almost universally by a forked stick that held a string "hoop" that was less hazardous to the trainmen.

Similarly, improvement came in the form of the telephone to replace Morse code (there are still some old-timers of Morse days who will debate this "improvement").

At one point during my railroad career, I became a train dispatcher. While Morse was no longer in use, issuing train orders by telephone was - and one had to remember when dictating an order to spell out every number and station name as well as to speak it; i.e., in addition to saying "23" one had to spell

out "t-w-e-n-t-y t-h-r-e-e." And "West Detroit" had to be spelled out "W-e-s-t D-e-t-r-o-i-t" so that the receiving operator could not mistake what was said. In turn, each operator copying the order as issued had to repeat it to the dispatcher in the exact same form as issued. It was time-consuming, but safe.

As time went on and signaling and communications improved, means were devised to speed up train movements: when electric currents could be sent through the tracks, automatic block signals came into being, increasing safety and lessening the need for written orders.

Next on the scene in the 1930's was CTC, or Centralized Traffic Control. Here the telephone was the means of communication, with the automatic block signals being upgraded to a system whereby the train dispatcher or operator had direct control via electrical circuits of the signals and switches on a line of track sometimes stretching over hundreds of miles.

In the 1950's, railroad radio came into wide use. It was to eventually revolutionize the control of trains, but not for many years. Prior to the adoption of FM as we use it now, "carrier current" radio was in use on a few lines. Even today, in locations such as the Moffat Tunnel through the Continental Divide, a form of "leaky" RF cable is used to carry signals through the tunnel where otherwise there would be an "RF blackout" for about six miles.

While airplanes had plenty of "open space" and were very easy to control by radio, most railroaders were fearful of casual radio conversations being used to move trains. Discipline was high in the operation of trains and it remains so.

One example of this fear being borne out took place in Cleveland, Ohio, - In 1974, a freight train on what was then the Penn Central smashed into an open drawbridge at high speed, killing the engineer and brakeman. While signals were displayed to show the bridge was closed to rail traffic, radio conversation from an operator allegedly indicated the route was clear for the train. The

crew, listening to the radio, apparently disregarded the trackside signals.

Today, radio is widely used for the dispatching of trains, but under strict rules. Orders must be repeated word for word, must be written, must not be erased or written over, numbers and names to be spelled out, etc. From the days of Morse to telephone and radio, from kerosene lanterns to walkie-talkies, from hand-written orders to computers, railroads advance into the electronic age.

We'll conclude in the next issue...

73, George N8CIX/Ø



LAST MINUTE RESERVATIONS

It is not too late to join the PPRAA Christmas Party. This is no ordinary party. It is a whole evening of entertainment. First there is a great meal at the PPRAA reserved table with lots of opportunity to discuss the holidays with your ham friends. Then there is the raffle for the great handheld transceiver. Last minute tickets available! Then the fun begins with the melodrama "Ho Ho Ho and a Barrel of Fun". After the show, there is further entertainment as the cast joins in a musical treat from the 50's and 60's.

We already have 28 of your friends signed up. There is still time to get a reservation, but hurry. Reservations will be accepted via the Club up to Wednesday, 10 December. Contact Phil, VE1ARC as soon as possible for details. Phone 590-7136 after 5:30 PM.



VHF AND ABOVE NEWS

by NKOP

Have you ever wanted a second receiver to monitor a specific frequency for a band opening? Well read on!! Bignectics has a chip on the market that will do just that with only a handful of external components. TDA7000 is an 18 pin DIP chip with an RF amp, mixer, Low IF amp, limiter, phase demodulator and auto detector. The internal IF runs on 70KHZ and is a phased locked loop. The chip will perform to 115 MHz. I have learned recently that a slightly improved version will go to 200MHZ. Also available is one that will allow a BFO for CW & BSB reception. Nice you say, but how much?? Would you believe \$5.00? Not only that but an etched circuit board is available for \$5.00 from the same source. I have just completed mine and plan to use it on 108HZ. (see Oct.86 - 73 magazine). Many other applications come to mind.

The 2 meter moonbounce contest ended the 22nd of November and rumor has it that a station worked 255 contacts and 55 multipliers all off the moon!! I have a hard time getting that many on Tropo!

The Front Range Microwave Society plans another meeting in December. The last meeting was well attended and very informative. If you are at all interested in communications above 1000MHZ, I encourage you to check it out. I will put dates and times in Q-Beat as I find out about them. I have not heard of any VHF band openings around the front range this month. If anyone hears of any DX on 50MHZ or above, let me know so I can print it here.

Well I hope everyone has a super Holiday Season! 73s and C U on the bands.

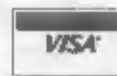
Ron NKOP.

CONGRATULATIONS TO NEW NOVICES

KA0YPM Wade Costley 715 Orion Dr 80906
KA0YPX Frank Roybal 1246 E LaSalle 80907

Quiz: What is the symbol for a transmission of telegraphy by on and off keying?

WV IJMSUV



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HOMEBREW NIGHT

Remember that January is homebrew night. The plan is: finish up your latest project or dust off something you have built before but never showed anyone. Bring it to the January meeting and take a couple of minutes to tell the rest of us about it. Then we will vote, and you will probably win one of the cash prizes to help you finance your next project. Don't worry if your project is massive or miniscule. Size is not important. Good workmanship or clever ingenuity get high marks.

SMOKING AT THE GENERAL MEETING

No one likes to complain, especially among friends. However, some folks have mentioned that they had a rough time at the last few meetings because of the dense smoke. The low ceilings and poor ventilation are the problem. Apparently at least one member lost a couple of days of work due to getting an overdose of smoke. Everyone appreciates how difficult it is for smokers not to smoke. But maybe those who smoke a lot could try to keep it to a minimum during the meeting, and maybe smoke in the main dining room during the break. It would sure make it a lot more bearable for those who are adversely affected, and who may have to quit attending the meetings. Your thoughtfulness would be very much appreciated. Thanks.

ANTENNAS
by Chris Smith
WB0DHU

"Invisible antennas" is a catch-all term for antennas that seem to be almost anything except antennas. Some of my own designs fit in this category, some by intent. There is a certain subgroup of the ham community for whom invisible antennas are a noble idea right up there with "pursuit of happiness." It is for those hams, be they apartment dwellers or residents of "planned communities," that this column is written.

Two things are evident - an invisible antenna should radiate like an antenna and should not look like one. The latter point may be broadened. An invisible antenna should not attract undue attention to itself. Consequently, it must not generate noticeable interference and it must be safe. An antenna that wipes out TV in an apartment complex or sets it on fire does not qualify!

Invisible antennas may be outdoors or indoors, or both. Some of the most satisfactory designs are erected outdoors. A common example is a flagpole modified to radiate. If the flagpole is metal then it could be insulated from ground and driven like a vertical. This might be satisfactory at low power, but at anything over 20 watts or so, it would not be safe - some one could touch it and be burned. A better solution would be a non-conducting flagpole with a wire run up the middle, again driven against ground. The end of the wire should be terminated in a smooth conducting object - I've used washers - and well insulated because the tip voltage can go very high.

Indoor antennas can also work well. I used an indoor wire, fed by a tuner in my second floor apartment and using a fire escape as a counterpoise to work 75 MARS nets for two years. B4BNH/M6, a friend of mine and a noted antenna designer at TCI, has found a novel solution for his house, now under construction in a "planned development." His house has two chimneys with galvanized liners. He is hard soldering the joints, adding radials, and attaching wires to permit shunt feeding them. Studies with MININEC promise 4-5 dBi gain with both the endfire and broadside feeds on 40 meters!

The principle problems with indoor antennas are short lengths and coupling to wiring. While exceptions can be found, a good rule of thumb for the minimum length of wire to use as an antenna is 0.1 wavelength. An 80 meter antenna would then require a length of 8 meters - or about 25 feet. In many apartments such a length would be hard to come by, at least without a few twists and turns.

Coupling to wiring indoors is a frustrating problem. It is hard to guess where the wires are in the walls and ceilings. Any portion of wiring that lies parallel to your antenna wire is going to pick up some of your signal. That will lead to RFI problems or worse. Power line pickup of your signal will cause interference with almost all consumer electronic equipment. What could be worse? Well, the odds are that some where along the power line will be some un-bypassed non-linear device like a diode or SCR. In such cases, part of your signal will be mixed and re-radiated. The resulting harmonics and garbage could get you a pink ticket and an order from the FCC to shut down.

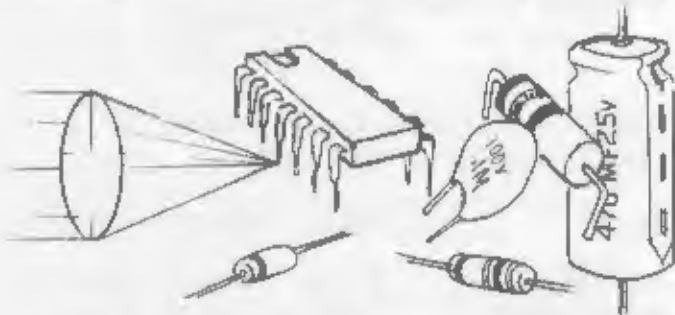
The solution is hard - you must find out where the wiring is in the structure, and orient your antenna wire perpendicular to it or as far from it as the situation allows. Since the RF pickup on interior wiring is going to be at its worst in your apartment, make sure everything in your apartment is bypassed for RF on the power lines. Even then you must test your setup - preferably at 3:00 AM rather than during the Superbowl - to be sure your signal is clean. Have a couple of local hams listen for your second and third harmonic as you try the bands you want to work. Be sure to listen in and around your shack too - but be sure the receiver is not overloaded by your signal. If your signal passes these tests, it is unlikely that you are radiating an objectionable signal. Now you just have to worry about fundamental overload! The usual solutions apply: QRP, highpass filters for the neighbors and a fondness for QSOs at 3:00 AM.

There is still the matter of how to feed your invisible antenna, and still the question of safety. I hope to cover these topics in a future column.

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"Ham/West86"

by J. R. Sorrells WA9ABB

The 1986 Ham/West convention was held at the Hacienda Hotel-Casino in Las Vegas, Nevada, on November 7 & 8. This two day affair included several forums, VE testing, and an evening banquet. Wayne Green of 73 Magazine was guest speaker at the banquet. Most of the indoor activities took place in a large convention room. Kenwood, Yaesu, and Icom had impressive displays with all of the latest and greatest equipment. There were many other smaller commercial dealers present. The flea market was outside in a parking lot and was comparable in size and quality to the PPRAA swapfest of last May. By my guesstimation there were 2 to 3 thousand attendees. Most of the hams present were from 6 and 7 land.

Overall, Ham/West was about 1/3 the size of the Dayton show. On a scale of one to ten (Dayton Hamvention = 10), I rated Ham/West a 7. It was well organized and run. They had some very good prizes. The grand prize was a new Yaesu 767 all mode, all band rig. Preregistration was \$12 - about the same as Dayton.

Holding the convention in Las Vegas is definitely a plus. I talked my xyl into a nice three day vacation and then told her "Oh, by the way, there is a swapfest that weekend." I only spent about 4 hours at Ham/West, but saw all I wanted to. Would have been nice to have gone to the banquet and some of the forums, but did not want to leave the xyl alone at the blackjack tables too long! We had great time in Vegas, and the hamfest was an added treat for me. If the organizers keep improving the show, in a few years it may even rival Dayton. So next fall, you might try asking your honey "How would you like to take a little vacation to Vegas dear?" What the heck, it worked for me - HI!

73's, Jim WA9ABB



"Fox Tango Product Review"
by J. R. Borrelli WA9ABB

I have owned the Yaesu FT757BX HF transceiver for 1 1/2 years. It is a pretty good rig for the money, but I have not been satisfied with c.w. selectivity. The factory c.w. filter is rated at 600hz and does not have very steep skirts. Even with I.F. shift, it often is not adequate during crowded band conditions.

The Fox Tango corporation makes crystal filters for a variety of Yaesu rigs including a 2.1khz SSB filter and 500hz and 250hz c.w. filters for the FT757. They usually sell for \$55 each.

Installation of the filters is not difficult, but does require some "nerve" to disassemble and perform minor surgery on the rig. The filters come with a very clearly written set of instructions. The F.T. filters are 1/16 to 1/8 inch taller than the stock filters. After installing the filters, it is necessary to cut five brass standoffs which support the main R.F. board. Alignment may be done by three different methods. The simplest alignment procedure requires no test equipment. Just zero beat the carrier of a known a.m. broadcast station and tweak two pots for the most intelligible speech in lower sideband and upper sideband. Total installation time takes about 1 1/2 hours.

Performance of the rig is dramatically improved both on SSB and c.w. Just wish I had made this modification sooner. If any of you other 757 owners decide to install these filters, give me a call. I will be glad to lend a hand.

73's, Jim WA9ABB



November 15, 1986 VE Test Results

TEST	1A	1B	1C	2	3	4A	4B
GIVEN	3	9	3	2	9	4	0
PASSED	2	1	0	1	6	4	0
% PASSED	67	11	0	50	67	100	0

TOTAL TESTS GIVEN = 30
TOTAL TESTS PASSED = 14
% PASSED = 47

UPGRADES N1,T5,G1,A4,E0 TOTAL = 11
TOTAL ATTENDED = 21
% UPGRADES = 52

CONGRATULATIONS to the following on their recent upgrade or new license:

Name	Call	Before	Upgraded
Augustus Dent	N0BTA	General	Advanced
Dwight Wood	KA0MHV	General	Advanced
Paul Bower	WA7YNJ	General	Advanced
Elsie Swain	KA0WIN	General	Advanced
Ernest Burchill	KA0YDK	Novice	General
Katharine Redding	KA0VUP	Novice	Tech
Roy McDaniel	KA0YVI	Novice	Tech
Joseph Webster	KA0WMZ	Novice	Tech
Rueben Roberts	KA0YRH	Novice	Tech
Thomas Reich	KA0YUD	Novice	Tech
Jeffrey Boyes	None	Unlicensed	Novice

My thanks to all VE's and others who have provided their excellent assistance and support during previous examinations. Max Stafford, K0OEL has volunteered to act as the Team Liaison Officer for the next group of examinations starting with the February examinations.

73 Pete NOLA

CHRISTMAS PARTY RAFFLE
Kenwood 21AT
Shirt-pocket 2m HT with TT pad
Purchased from Miley's Radio
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Announcements:

Presentation to Ex-President - Les KCONC:
On behalf of the PPRAA, president Don KE0BJ presented Les KCONC with a lovely plaque and gavel in recognition of Les' excellent service to the PPRAA during his past term as president.

New Phone Bulletin Board - Bdale N3EUA:
Bdale has an amateur radio BBS, phone 593-0766.

Prizes - Ron NKOP: Winners were:

WA5BKK	Jim	Wintronic \$10. cert.
KA0YLR	Sylvia	ARRL book.
KB2BAJ	Eleanor	OSCAR book.
AH6AP	Myron	Bag of new parts.
NOCHW	Al	Free bowling - Ute Lanes
WA0SX	Jim	Centennial \$10. cert.
NOBYM	Karl	Rules and Regs book.
No call	David Babel	Tech/Gen manual.
KA0WMZ	Joe	Schematic Diagrams book.

Program:

Ray, AAOL chaired an enlightening, and perhaps controversial, discussion on the mystique of station grounding.

Jim, WA9ABB presented his ideas on how amateur radio can be thoroughly enjoyed without spending a lot of money on equipment. To emphasize his point, he demonstrated a nice RTTY station using mostly older, inexpensive gear.

MINUTES OF NOVEMBER BOARD MEETING submitted by Al NOCHW

The board meeting was held on Monday, 17 November 1986 at the home of Ron, NKOP. Those in attendance were Don KE0BJ, Al NOCHW, Jim WA9ABB, Bud N0DDF, Phil VE1ARC, Jake NOCYR, and Ron NKOP.

Had a discussion on smoking at general meetings. It was decided to ask members and guests to try to cut down on smoking. Because of bad ventilation and low ceilings at the meeting place, heavy smoke caused some members to become ill after the last meeting. If any one knows of a bigger meeting place at no expense to the club please contact one of the officers or board members.

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TAB BOOKS

It was decided to dispose of the club's Icom 215 crystal control rig at a future date as the batteries have gone bad.

Bud N0DDF had contacted Torp at the senior citizen center and will drop a pad of message forms for him. Arrangements were made to get them out on the nightly traffic net on 3/7/97.

Jim WA9ABB is in the process of filling out the renewal for the raffle license. All board members are listed on application. As of this date, 150 tickets have been sold for the raffle of the HT at the Christmas party. A date will be set up this month to present the library with the ARRL books. It was decided to purchase another generator for the club to be used for public service and emergencies. Jim WA9ABB will arrange for the purchase. The money will come from the raffle proceeds which have to be spent by 31 Dec on public service.

There will be no general meeting in December. Instead, the PPRAA Christmas Party will be held on 12 December. The next board meeting will be held on 15 Dec at the home of Al, NOCHW.

NOVEMBER PRIZE WINNER OF \$50 GIFT CERTIFICATE

Buck WDØGSK NEXT DRAWING SATURDAY DEC. 27

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Icom 04AT \$339
Icom 27A w/TTM \$349/Icom 27H w/TTM \$369
Icom 47A \$439
Icom 3200A 2 meter/440 dual bander \$469 (2 only)
Dawa Meters, Switches & Rotors - In Stock - The Dawa rotor is great!!
Mirage Amps - Low Prices - In Stock
New KDK FM 240 mini 25W w/TTM & LCD display, encoder/decoder TO 156 MHz receive \$320 w/o tone \$290
Yaesu FT 209RH 5 watt FM HT \$224
Yaesu FT 2700RM 2 mtr 70 cm dual bander full duplex \$459 (2 only)
Yaesu FT 227R 2/70cm HT - New CPU \$385
Yaesu FT 23R 2 Meter HT w/TT Pad \$265
Yaesu FT 73R 70 cm HT w/TT Pad \$295
Ten Tec Corsair II HF Xcvr \$1149
Ten Tec Century 22 HF CW Xcvr \$349
Special of the Month New Ten Tec TT920 Air Band HT 108-136 MHz AM \$375
THE (Tokyo High Power) 35V 2/25 watt FM Amp GasFet preamp \$84
Astron PS - ALL AMPS - Low Prices - Astron RS 50 and V50 In Stock
Now a factory dealer for Mosley antennas - Special prices until
12/31 - full line in stock. TA33 - \$220 TA33 Jr. \$175
Butternut HF6V 80-10 mtr. vertical \$115 Butterfly beam \$179
B&W AXS 160 shortened 160/30 mtr. dipole 95' long \$94
B&W AXS 80 shortened 80/40/15 mtr. dipole 64' long \$94
B&W AS 80 shortened 80/40/20 mtr. dipole 78' long \$94
Welz test meters in stock - all power levels and frequencies
New B & W VS 300 tuner - best 300W tuner for the price! Special \$84
Amp Supply LA 1000A 1000W PEP amp - Special \$415
Amp Supply LX 500 2B w/o QSK \$1000 - 1 only
Ameritron Amplifiers - At 80A - 1.3-3002 - In Stock \$649
Ameritron remote antenna switch - RCS 4 & 8V - \$120
AEA CP1/64 MBA Text Pac \$200
AEA PK 232 data controller internal HF/VHF modem \$305
AEA CP-1 Computer Interface \$178
AEA PK 64 packet/cw/rty etc. controller \$200 - stfm \$95
AEA PK 64 system w/HFM 64 installed \$310

Kentronics KPC 1 Level 2 - special sale \$138 - 2 only
Kentronics Packet Program - includes program for LTL
Kentronics LTL XT/P now includes Packet for HF
Kentronics KPC 2 Packet Controller version 2 w/HFM \$163
Kentronics Hamfest Hamfest VIC 20/64 \$75
Kentronics KAM all mode controller -
CW/RTTY/ASCII/AMTOR or Packet \$275 (HF & VHF Packet)
MFJ wet & dry dummy loads - in stock
MFJ Tuners and Keyers - in stock
MFJ 989 roller inductor tuner \$288
MFJ 962 1.5 KW tuner - 160 to 10 meters \$219
MFJ 1224 interface in stock w/free soft program Fall Sale - \$75
MFJ 1229 interface w/free soft program Fall Sale - \$149
MFJ 1220 packet controller (TNC-2) \$120

USED EQUIPMENT

Kenwood TR 9130 2 meter all mode mobile - Nice - \$395
Kenwood TR 2600 - nice \$115
Kenwood TS 820 CW filter \$435
AT 260 Tuner \$95
Kenwood TS 430S CW, 598
Kenwood TS 520 \$350
Kenwood ST1 desk power supply/charger for TR 2400 \$35
Kenwood AT 250 auto tuners \$225
Astron PCS 4000 25W mobile FM \$200
Tempo 575 w/new battery \$150
Icom 02AT \$250
Icom 02AT w/mod \$275
Yaesu FT700R 70 cm HT \$185
Yaesu FT757 HD \$195
Yaesu 757AT auto tuner \$195
Yaesu FT 101E \$325
Yaesu FT 101B \$275
Yaesu FL2100B used, mini \$325
Yaesu FT 237GX - Nice \$625
Yaesu FT 270RH - 2 mtr FM 45W \$275
Yaesu FT 221 - 2 mtr. all mode base/mobile \$275
Yaesu FT 207R - Nice \$115
Drake L4B - Nice \$650 tubes good
Drake TR4C, MS4 ps/spkr \$250 very nice
Tokyo High Power 160V 3/10 in 160 out amp w/preamp \$275
Icom 720A - nice - \$495
Icom 2AT - \$135
Mirage B100 2 meter FM/SSB amp - HT or 10W in/80 out \$125
AEA CP1/64 w/MBA TextPac \$100
Heath SB710 6 meter 100W ssb/cw w/p.s. \$300
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Are You An ARRL Member? ☐ Yes ☐ No Telephone _____

☐ Full Member \$12.00 ☐ Family Membership \$15.00 ☐ Newsletter Only \$4.00
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Additional Names _____ Call _____ Class _____

Associate Member \$8.00 ☐ (Outside Teller & El Paso Counties.)